

REMARKS

Entry of the foregoing amendments after final rejection as narrowing the issues and presenting the claims in condition for allowance or better form for appeal is solicited. The foregoing amendments after final rejection have not been earlier presented because of the newly cited references and new grounds for rejection.

The outstanding objections to the drawings are respectfully traversed. The applicants respectfully submit that the forgoing amendments overcome such objections and therefore request reconsideration and withdrawal of the same.

Claims 1-6 and 8-11 are at issue. Claims 1-2, 4 and 11 were rejected as unpatentable over Mehr (U.S. Pat. No. 5,530,295) in view of Ohno et al. (U.S. Pat. No. 5,227,662). Claims 3 and 5 were rejected as unpatentable over these references further in view of Majumdar et al. (U.S. Pat. 5,703,399). Claim 6 was rejected as unpatentable over Mehr and Ohno et al. further in view of McCarthy et al. (U.S. Pat. 3,956,726). Claim 8 was rejected as unpatentable over Mehr and Ohno et al. further in view of Tomita et al. (U.S. Pat. No. 5,440169). Claim 9 was rejected as unpatentable over Mehr, Ohno et al. and Tomita et al. further in view of Majumdar et al. Claim 10 was rejected as unpatentable over Mehr and Ohno et al. further in view of Park et al. (U.S. Pat. 6,239487). Claim 10 was further rejected as indefinite. The applicants respectfully traverse the rejections.

The applicants submit that claim 1, as amended, is not obvious over Mehr in view of Ohno et al. The action does not make out a *prima facie* case of obviousness. For example, the action does not point to disclosure that would suggest or motivate one of ordinary skill in the art to combine the references. In fact, Ohno et al. teach away from claim 1 by stating that an insulating adhesive tape (16), or other bonding means, bonds a pad (i.e., heat sink) to the lead frame (10). The bonding means (16) provides electrical insulation between the pad (i.e., heat sink) and the lead frame (10). (See Ohno et al., col. 2, ll. 51-65; Figs. 6 and 7) Ohno et al. would therefore appear to suggest that the heat sink (14, 32, 40) alone is not effective for electrical insulation and should not be in direct contact with the lead frame (10), thereby teaching away from the device of claim 1, despite the fact that aluminum nitride (AlN) may be selected as the material for the heat sink (40).

Further, Ohno et al. teaches away from the device of Mehr. Mehr discloses a heat sink (22) pressed against a lead frame (18). The heat sink (22) is made of a thermally conductive material such as nickel plated copper or anodized aluminum. The action notes the

deficiencies of Mehr for failing to disclose a heat sink having an electrically insulating property. As discussed above, Ohno et al. discloses a heat sink (14, 32, 40) that is separated from the lead frame (10) by an electrically insulating bonding means (16) to provide electrical insulation between the heat sink (14, 32, 40) and the lead frame (10), thereby teaching away from a heat sink that contacts a lead frame, as disclosed by Mehr. One of ordinary skill in the art would therefore not be motivated to combine the electronic package (10) of Mehr with the heat sink (40) of Ohno et al.

It is submitted that one of ordinary skill in the art would not modify the device of Mehr to provide a good electrical insulation property and low cost for the semiconductor package, as shown by Ohno et al. In particular, neither Mehr nor Ohno et al. disclose good electrical insulation property as a property. As discussed above, Mehr discloses a heat sink (22) made of nickel plated copper or anodized aluminum, which do not provide good electrical insulation. Also as discussed above, Ohno et al. uses an electrically insulating bonding means (16) which suggests that the use of a heat sink (14, 32, 40) alone is not effective for electrical insulation. In fact, good electrical insulation is an advantageous property mentioned by the applicants throughout their specification. Basing the suggestion or motivation to combine on the applicants' disclosure is not a proper basis for asserting a suggestion or motivation to combine. See MPEP 2143

Further, Ohno et al. disclose that only a particular embodiment shown in Figs. 3A-3D and 4 has the advantage of low manufacturing costs (col. 4, ll. 28-31). This advantage is not attributed to the embodiment on which the official action relies for showing a heat sink (40) made of AlN. (See Figs. 6 and 7) Figs. 3A-3D and 4, and the discussion thereof, do not include a heat sink (40), much less a heat sink made of AlN. Instead, a portion (32) of the lead frame (10) functions as the heat sink (col. 4, ll. 48-53). One of ordinary skill in the art would therefore not be motivated to modify the device of Mehr to provide low cost for the package, because only the embodiment that does not use a heat sink (40) provides the advantage of low manufacturing costs. Further, Therefore, neither Mehr nor Ohno et al. provide any suggestion or motivation to combine their respective disclosures.

The applicants further submit that neither Mehr nor Ohno et al. teaches or suggests all of the limitations of independent claim 1. In particular, claim 1 recites that the sealer is thermally conductive. Although Mehr discloses a dielectric housing (16), there is nothing to indicate that the housing (16) of Mehr is thermally conductive. In fact, the use of a heat sink

(22) having a large surface area exposed to the ambient air to improve thermal dissipation (col. 2, ll. 38-48) would tend to suggest that Mehr is improving thermal dissipation only by the heat sink (22) without altering the material for the dielectric housing (i.e., glass filled epoxy), which has little thermal conductivity. (See Mehr, col. 1, ll. 17-20)

Likewise, although Ohno et al. disclose that the semiconductor chip (34), composite lead frame (10), and heat sink (40) are sealed with resin (38), and that some heat may be dissipated through the resin (38), Ohno et al. also discloses that the resin (38) is not an excellent heat conductor (col. 5, ll. 40-44). The fact that the resin (38) is not an excellent heat conductor (hence the need for the heat sink (40)), would indicate that the resin (38) is generally not thermally conductive. The action's rejections of claim 1 and claims 2-6 and 8-11 dependent thereon are therefore improper for failing to cite reference that teach or suggest all of the claims limitations of independent claim 1, whether taken individually or in combination. It is clear that a *prima facie* case of obviousness cannot be established where all the limitations of a claimed combination are not taught or suggested by the prior art. See *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). See also MPEP 2143.03.

Regarding the indefiniteness rejection of claim 8, new Fig. 4 indicates an example of how the heat sink may be adhered to one of the lead frame and the sealer with an adhesive. In particular, Fig. 4 discloses that the lead frame (40) may have grooves along the bottom and an adhesive formed inside the grooves. As seen in Fig. 4, the heat sink (70) may be adhered to the lead frame (40) with the adhesive yet remain in direct contact with the lead frame (40). As would be understood by those of ordinary skill in the art, a similar arrangement may be used to adhere the heat sink (70) to the sealer (60). The applicants therefore respectfully submit that the drawings show every feature of claim 8.

Regarding the indefiniteness rejection of claim 10, new Fig. 5 indicates an example of how the heat sink and the sealer may be connected to each other by means of grooves or rings. In particular, Fig. 5 discloses that the heat sink (70) may have rings along the sides that engage with grooves in the sealer (60). The applicants therefore respectfully traverse the indefiniteness rejection of claim 10.

Accordingly, the applicants respectfully submit that all pending claims are patentable over the art of record and should be allowed. In the light of the foregoing, prompt issuance of a notice of allowance is respectfully solicited.

Should the examiner have any questions, she is respectfully invited to telephone the undersigned.

Respectfully submitted,

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